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**BOEING REALTY CORPORATION
FORMER C-6 FACILITY
LOS ANGELES, CALIFORNIA**

**INTERNAL TECHNICAL MEMORANDUM
LOT 8 PROPOSED BUILDING VAPOR INTRUSION
AND BARRIER EVALUATION**

To: Mr. Brian Mossman
Mr. Mario Stavale
Mr. Stephane Wandell
Boeing Realty Corporation
Long Beach, CA 90846

From: Haley & Aldrich, Inc.

Date: 07 June 2004

Re: Lot 8 Proposed Building Vapor Intrusion and Barrier Evaluation, Boeing Realty Corporation, Former C-6 Facility – Parcel C, Building 1/36-Los Angeles, California

Boeing Realty Corporation (BRC) is in the process of evaluating design components of a planned, approximately 150,000 square foot (sf) warehouse structure to be constructed on Lot 8 of the Former C-6 Facility (Site), located in Los Angeles, California. A key decision is the installation of a vapor barrier below the proposed office area of the building. This memo discusses indoor air quality modeling calculation results and provides recommendations regarding potential mitigation measures.

BACKGROUND/OBJECTIVE

Lot 8 is the location of the former Building 1/36 solvent tank farm and manufacturing complex. Shallow soil (top 12 feet or 52 to 40 feet mean sea level) has been remediated, and a post-demolition risk assessment performed. The Regional Water Quality Control Board - Los Angeles Region (LARWQCB) issued shallow soil closure for non-residential use based on the results of the post-demolition risk assessment, including indoor air quality calculations. Deep soil and groundwater contain elevated concentrations of volatile organic compounds (VOCs), and are currently being addressed through long-term soil vapor extraction (SVE) and groundwater bioremediation programs.

Indoor air quality as a result of vapor migration from VOC impacts in soil and groundwater has been increasingly part of the buyer due diligence property transfer process. Additionally, recent changes in risk assessment modeling and the more wide-spread acceptance by the industry and regulatory agencies of the Johnson & Ettinger Vapor Intrusion Model (J&E Model) may result in higher indoor air quality risk levels than previously calculated.

OBJECTIVE

Evaluate if the use of the J&E Model for the proposed Lot 8 building and associated office area results in potential indoor air quality issues in excess of the existing LARWQCB closure for the purpose of vapor barrier installation.

EVALUATION

Haley & Aldrich used the J&E Model to evaluate if soil and groundwater VOC concentrations at Lot 8 result in potential indoor air quality issues. The J&E Model was set up for Lot 8 using the default parameters and the following Site-specific data:

- Building slab on grade
- Building office size of 5,964 sf, with 9 foot high ceilings and recirculation-type HVAC system.
- Site-specific soil parameters
- Maximum detected deep soil VOC concentrations
- Maximum detected groundwater concentrations

RESULTS

The results of the J&E Model evaluation as outlined above indicate the following regarding the indoor air quality in the proposed office space:

- A cancer risk below the regulatory threshold of 1×10^{-5}
- The hazard index above the regulatory threshold of 1

The model is suggesting that non-carcinogenic VOCs such as methyl ethyl ketone (MEK) and 4-methyl-2-pentanone (MIBK) are resulting in indoor air exposures in excess of recommended levels (hazard index > 1). While the SVE and groundwater bioremediation systems are addressing these compounds, elevated levels are anticipated to exist for several more years.

RECOMMENDATIONS

Although the post-demolition risk assessment approved by OEHHA and the LARWQCB calculated acceptable indoor air quality, Haley & Aldrich recommends the installation of a vapor barrier (estimated cost of \$50K) under planned office areas as a contingency measure based on the following:

- A due diligence review and vapor intrusion modeling effort using the J&E model could suggest that the building has unacceptable non-carcinogenic air quality. This in turn could reduce the value or offering price of the project far in excess of the \$50K cost of the vapor barrier. The buyer's price could be reduced by a perceived project health risk, thus placing a stigmatism. It could also be justified for the installation of higher capacity HVAC systems for the offices and long-term utility costs to operate them.

- The United States Environmental Protection Agency (EPA) is proposing new toxicity values for VOCs, particularly TCE. If these new toxicity values are implemented by the EPA and adopted by the State of California, vapor intrusion modeling will show unacceptable human health risk, which will require vapor mitigation.
- A vapor barrier, once installed, has virtually no maintenance, and if properly installed, should last the life of the building.

Alternatively, ventilation wells and piping could be placed below the office area at a cost of \$30-\$40K. This however, is an active system with ongoing operations, maintenance, and utility costs which would be required to achieve the same risk reduction as the vapor barrier. This system would be considered far less desirable from a buyer's perspective due to the long term O&M aspect.

It is also recommended that all the slab joints be caulked with a flexible floor caulking to mitigate potential vapor migration into the building. All utility penetrations through the slab should also be sealed to mitigate potential vapor migration into the work areas.

Additionally, Haley & Aldrich recommends the installation of sub-slab ventilation wells and piping under the non-office areas of the building. No mechanical equipment would be installed at this time. This mechanical system would be completed and activated only in the event that elevated vapors were detected or the new toxicity values were adopted and resulted in indoor air quality issues. The estimated cost for this ventilation network is on the order of \$20K, and would mitigate a potential buyer claim to install an active warehouse ventilation system at a cost in excess of \$75K-\$100K. A similar system was installed under the western RREEF building.

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